

REMARKS

This Preliminary Amendment is submitted in reply to the Office Action in the parent application dated March 13, 2003.

Upon entry of the foregoing Amendment, Claims 1-3, 5, 7-8, 13-19, 21, 23, 25, 31, 33-37, 42, 47, 50-56, 59 and 97-101 are pending in the application. The amendments are believed to introduce no new matter, and their entry is respectfully requested. Based on the above amendment and the following remarks, Applicant respectfully requests that the Examiner reconsider and withdraw all outstanding rejections.

Summary of the Examiner's Rejections to Pending Claims

Claims 1-3, 5, 8, 14-15, 17-19, 23-31, 34-36, 42, 47, 50-51, 53-54 and 56 were rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as being obvious over Skotheim (US 4,442,1885).

Claims 1-3, 5, 8, 13-19, 21, 23, 25, 31, 33-37, 42, 47, 50-54, 56 and 59 were rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as being obvious over Chen (US 4,076,904).

Summary of Amendment

Applicant has cancelled Claims 4, 6, 9-12, 20, 22, 24, 26-30, 32, 38-41, 43-46, 48-49, 57-58 and 60-96. The cancelled claims remain in the parent application and are deemed allowable therein. Applicant has amended Claims 1-3, 7-8, 31, 35, 47 and 50-54 and added Claims 97-101 to more particularly define the present invention.

Applicant has also amended the specification to refer to the parent patent application.

Remarks Regarding §102(b) and §103(a) Rejections

Applicant respectfully submits that independent Claims 1 and 31 as amended are patentable over Skotheim and/or Chen. The claimed invention as recited in amended independent Claim 1 (for example) is directed to a multilayer solid-state device for producing electrical power from light comprising: a light energy conversion layer; a two-sided conducting layer having the light energy conversion layer secured to a first side thereof; and a charge separation layer secured to a second side of the conducting layer wherein the conducting layer ballistically transports charge carriers from the light energy conversion layer to the charge separation layer which eliminates the need for an electrolyte when producing electrical power from light that impinges upon the light energy conversion layer (emphasis added to show distinguishing limitations). Amended

independent Claim 31 contains the same or similar distinguishing limitations which are recited in pending Claim 1.

Skotheim discloses a photoelectrochemical cell that converts solar energy to electricity. In one embodiment shown in FIGURE 13, the photoelectrochemical cell includes in sequence a n-type semiconductor 131 attached to a highly conductive layer 134 which is attached to a dry solid polymer electrolyte 133 which is attached to a p-type semiconductor 132. The highly conductive layer 134 is a polymer blend of a highly conductive polymer such as polypyrrole and a solid polymer electrolyte (see, e.g., col. 15, lines 33-41).

Chen discloses a solid state photogalvanic device that utilizes sea water as an electrolyte. In one embodiment shown in FIGURE 2, the solid state photogalvanic device is immersed in sea water which functions as an electrolyte that contributes ions which makes photogalvanic action possible within the device that includes in sequence a photoactive thin film 28 attached to an electrode 30 which is attached to an insulating layer 32 which is attached to a counterelectrode 34. The solid state photogalvanic device generates electricity for a load after the device is immersed in sea water (electrolyte) and exposed to light (see, e.g., abstract, col. 2, lines 6-46, and FIGURES 2-3).

The teachings of Skotheim and Chen differ significantly from the pending independent Claims 1 and 31. In particular, the pending independent Claims 1 and 31 recite a limitation where the conducting layer ballistically transports charge carriers from the light energy conversion layer to the charge separation layer which eliminates the need for an electrolyte when producing electrical power from light that impinges upon the light energy conversion layer (emphasis added). Skotheim and/or Chen fail to teach or suggest where a multilayer solid-state device does not need an electrolyte to produce electrical power when light impinges upon the light energy conversion layer as claimed in the present invention. Instead, Skotheim and Chen teach away from the claimed device because the references disclose devices that require the use of an electrolyte to produce electrical power when light impinges upon the light energy conversion layer. In particular, Skotheim teaches away from the claimed invention because it discloses a photoelectrochemical cell that includes in sequence a n-type semiconductor 131 attached to a highly conductive layer 134 which is attached to a dry solid polymer electrolyte 133 which is attached to a p-type semiconductor 132 (see FIGURE 13). And, Chen teaches away from the claimed invention because it discloses a solid state photogalvanic device that is immersed in sea water which functions as an electrolyte that contributes ions which makes photogalvanic action possible within the device that includes a photoactive thin film 28, an electrode 30, an insulating layer 32 and a counterelectrode 34 (see FIGURE 2). The Examiner contended in the Office Action that Skotheim's highly conductive layer 134 and Chen's electrode 30 inherently provides for the ballistic transport of charge carriers however Applicant submits that this contention is not supportable in view of the present amendment because Skotheim's device and Chen's device both require the presence of an electrolyte to properly function.

Therefore, Applicant respectfully submits that the aforementioned difference between the present invention and Skotheim and Chen is indicative of the novelty and non-obviousness of pending independent Claims 1 and 31 and their associated dependent claims. Accordingly, Applicant respectfully requests reconsideration and allowance of pending independent Claims 1 and 31 and their associated dependent claims.

Reference is now made to the added independent Claim 97, Applicant respectfully submits that independent Claim 97 as added is patentable over Skotheim and/or Chen. The claimed invention as recited in added independent Claim 97 is directed to a multilayer solid-state device for producing electrical power from light comprising: a light energy conversion layer; a two-sided front conducting layer having the light energy conversion layer secured to a first side thereof; a two-sided charge separation layer having a first side secured to a second side of the front conducting layer; and a two-sided back conducting layer having a first side secured to a second side of the charge separation layer, wherein the multi-layer solid-state device does not need an electrolyte to produce electrical power from light received at the light energy conversion layer (emphasis added to show distinguishing limitations).

The teachings of Skotheim and Chen differ significantly from the added independent Claim 97. In particular, the added independent Claim 97 of the present invention recite a limitation where the multi-layer solid-state device does not need an electrolyte to produce electrical power from light received at the light energy conversion layer (emphasis added). Skotheim and/or Chen fail to teach or suggest where a multilayer solid-state device does not need an electrolyte to produce electrical power when the light energy conversion layer receives light as claimed in the present invention. Instead, Skotheim and Chen teach away from the claimed device because the references disclose devices that require the use of an electrolyte to produce electrical power when the light energy conversion layer receives light. In particular, Skotheim teaches away from the claimed invention because it discloses a photoelectrochemical cell that includes in sequence a n-type semiconductor 131 attached to a highly conductive layer 134 which is attached to a dry solid polymer electrolyte 133 which is attached to a p-type semiconductor 132 (see FIGURE 13). And, Chen teaches away from the claimed invention because it discloses a solid state photogalvanic device that is immersed in sea water which functions as an electrolyte that contributes ions which makes photogalvanic action possible within the device that includes a photoactive thin film 28, an electrode 30, an insulating layer 32 and a counterelectrode 34 (see FIGURE 2). Therefore, Applicant respectfully submits that the aforementioned difference between the present invention and Skotheim and Chen is indicative of the novelty and non-obviousness of pending independent Claim 97 and its associated dependent claims. Accordingly, Applicant respectfully requests allowance of pending Claims 97-101.

Reference is now made to the added dependent Claims 98 and 99, Applicant respectfully submits that dependent Claims 98-99 as added are patentable over Skotheim and/or Chen. The limitations recited in added

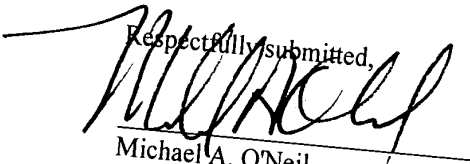
dependent Claims 98-99 are directed to a front conducting layer that has photoexcitable molecular species (Claim 98) or absorbing nanostructures (Claim 99) deposited thereon which enables charge carriers to be ballistically transported from the light energy conversion layer to the charge separation layer. Skotheim and/or Chen fail to teach or suggest where a front conducting layer has molecular species (Claim 98) or absorbing nanostructures (Claim 99) deposited thereon as claimed in the present invention.

Conclusion

From the foregoing, Applicants respectfully submit that all of the stated grounds of rejections have been properly traversed, accommodated, or rendered moot. Accordingly, Applicants respectfully request reconsideration of all outstanding objections and rejections and allowance of pending Claims 1-3, 5, 7-8, 13-19, 21, 23, 25, 31, 33-37, 42, 47, 50-56, 59 and 97-101.

If the Examiner believes, for any reasons, that personal communication will expedite prosecution of this application the Examiner is invited to telephone the undersigned at the number provided.

Respectfully submitted,


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